DOCUMENT RESUME

ED 202 513 JC 810 287

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TITLE Health Instruction Packages: Consumer--Diabetes.
INSTITUTION League for Innovation in the Community Coll., Los Angeles, Calif.
SPONS AGENCY Kellogg Foundation, Battle Creek, Mich.
PUB DATE 77
NOTE 135p.

EDRS PRICE MF01/PC06 Plus Postage.
DESCRIPTORS *Diabetes; Dietetics; *Drug Therapy; Learning Modules; *Patient Education; Podiatry; Two Year Colleges
IDENTIFIERS *Health Instruction Exchange; *Injections (Medicine); Insulin; Syringes; Urinalysis

ABSTRACT

Text, illustrations, and exercises are utilized in this set of seven learning modules designed to instruct diabetes patients in health care practices necessary for the control of their illness. The first module, by Barbara J. Cross, describes materials and procedures used in testing the urine for sugar and acetone. The second module, by Ruth Bockius, discusses the importance of maintaining the sterility of insulin injections and describes the utilization of a syringe. The third module, by Bonnie Johnson, explains how to write daily menus from meal plans prescribed for diabetes patients. The fourth module, by Anne M. Lorentzen, details steps in preparing and injecting an insulin dosage. The fifth module, by Verdell Washington, examines why it is necessary for diabetes patients to take insulin, identifies the types of syringes to be utilized with various insulin solutions, and details the use of a syringe in giving insulin injections. The sixth module, by Ronald H. Wakasa, discusses the various types of insulin available, the proper storage of insulin, the symptoms and prevention of adverse side effects, and the preparation of an insulin dosage. The seventh module, by J. A. Smith, reviews proper diabetic footcare, including methods of washing the feet and inspecting them for special problems. The modules, which take 20 to 30 minutes to complete, provide reinforcement exercises with immediate feedback and post-tests with answer keys. (JP)

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HEALTH INSTRUCTION PACKAGES:

CONSUMER -- DIABETES

Modules Prepared by:

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URINE TESTING FOR SUGAR AND ACETONE

by

Barbara J. Cross

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TITLE OF PACKAGE:	Urine Testing for Sugar and Acetone
AUTHOR:	Barbara J. Cross
INSTITUTION:	Santa Fe Community College, Dallas, Texas
INTENDED STUDENTS:	Diabetic patients
ESTIMATED WORKING TIME	30 minutes
MATERIALS NEEDED:	Booklets, What is Diabetes from Eli Lilly & Co., You and Diabetes and Urine Test Record from Upjohn Company; Box containing plastic medicine cups, bottle of glucose water, small pieces of white paper, bottle of Acetest tablets with chart, bottle of Clinitest tablets with special color chart for two-drop method, eye dropper, test tube.
REVISED:	Nov. 1, 1977

NOTE: Effective use of this unit requires that materials listed above be available and that a nurse or instructor check the patient's demonstration of the Clinitest and Acetest procedures.

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INTRODUCTION

You have recently been told that you have a condition called diabetes. Persons with diabetes have difficulty converting carbohydrates (sugar and starches) into energy which the body needs to operate normally. When this occurs, the excess amount of sugar in the blood spills over into the urine and leaves the body.

This explanation sounds simple, but it is really a very complex condition. However, YOU are very fortunate because you now know why you have been feeling bad and something can be done about it - with a little effort on your part. Control of diabetes can be attained by way of diet, exercise and either insulin injections or pills.

You and the doctor will need important information in order to control and maintain control of your diabetes. Testing your urine for sugar and acetone and recording the results are very important!

If diabetic control is not maintained, some very bad complications can result such as blindness, poor circulation that can result in infection or gangrene and loss of a toe, or even a leg. This condition could actually bring about coma and death! These horrible things need not happen if you are well informed and follow the rules.

The following instructional package will help you learn an important step in control of diabetes.

I.

Times at which you test your urine for sugar and acetone are very important! Here is an explanation:

Diabetics need to check the urine for spillage of sugar at times when blood sugar will be within normal level. Meals provide sugar which causes blood sugar to rise after eating.

In order to determine if your insulin dose or pill is controlling the blood sugar level, the test on your urine should be done at a time just before meals when the blood sugar level will be lowest. Testing of urine should be done before meals and at bedtime.

Your kit provides you with a booklet called "What is Diabetes" - Read page 6 and study the diagram (page 7) before going on.

I. The sugar and acetone test on the urine should be done _____ _____ and at _____ .

Turn the page for your correct answer.

OCT 6

The sugar and acetone test on the urine should be done before meals and at bedtime.

* * *

II. Now that you have learned when to test urine -- let's look at the what you test. Follow these directions:

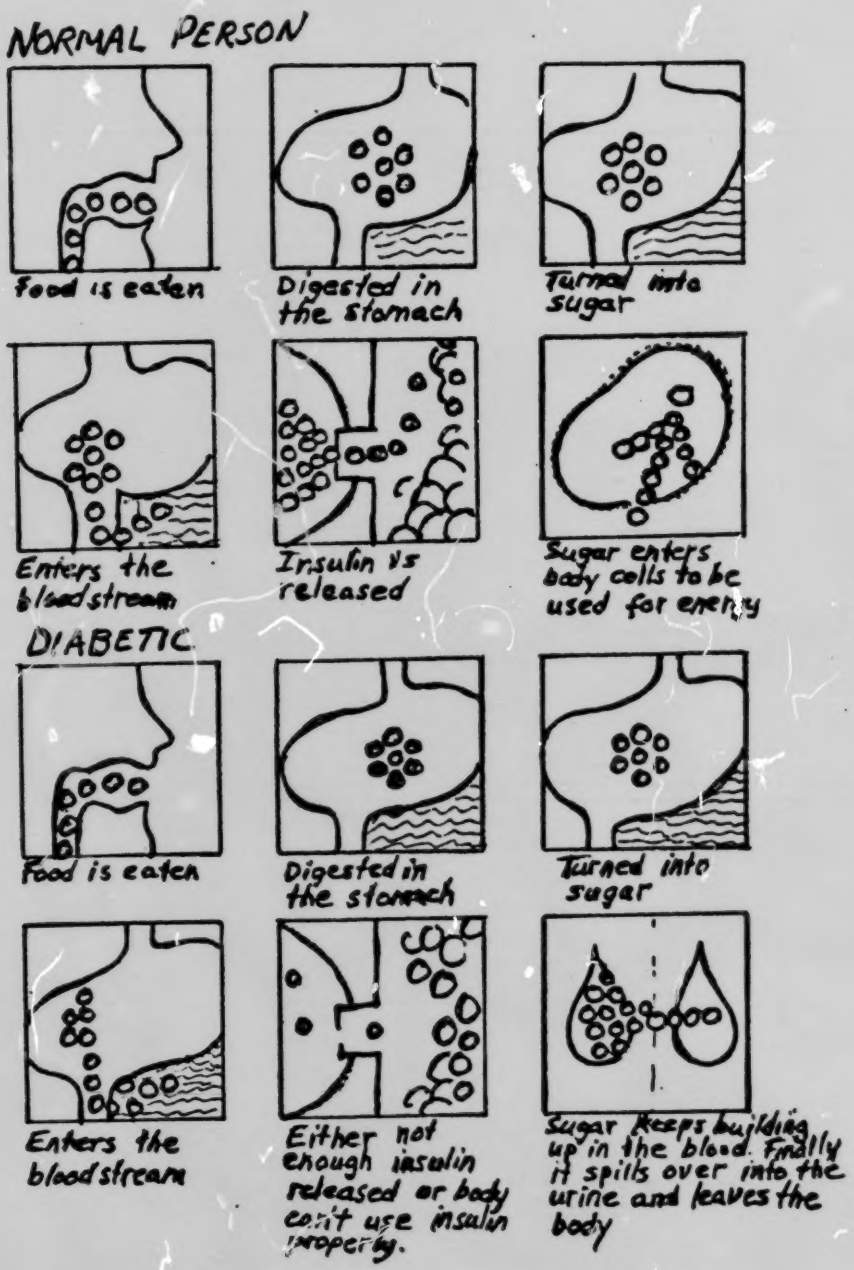
a. Urinate or empty your bladder one-half to one hour before you wish to make a test. This is the "A" specimen. Discard this urine. (Do not test, unless the doctor asks that "A" and "B" specimens be done). At times, recording both tests are helpful.

b. After emptying the bladder, about 30 minutes to 1 hour later, urinate again. This is the "B" specimen. Test this urine and record results. (If you have difficulty obtaining a "B" specimen, drink a glass of water). It is most important that you test the urine that has most recently come from the kidneys - the "B" specimen. Record in Diabetic Record Book that is provided. This is done before meals and at bedtime.

Now, explain to another person when you should collect your urine and how this is done. You may also write your explanation of "A" specimen and "B" specimen.

Urine testing for sugar and acetone should be done before meals and at bedtime. You should empty the bladder 1/2 hour - 1 hour before meals. Discard this urine unless told otherwise. Urinate again in 1/2 hour - 1 hour and test this "B" specimen. Record in record book.

III. WHAT IS SUGAR? Sugar is the nutrient (food) that the body uses to provide energy for body functions. In the normal individual, the blood sugar level is kept at a normal level by insulin. However, the diabetic person cannot use the sugar because of lack of insulin. The excess amount of sugar then spills over in the urine. You need to be aware of how much sugar you are spilling. This gives you and the doctor an indication of how well the insulin or pill or diet is controlling your sugar level.


NORMAL PERSON
Food is eaten
Digested in the stomach
Turned into sugar
Enters the bloodstream
Insulin is released
Sugar enters body cells to be used for energy
DIABETIC
Food is eaten
Digested in the stomach
Turned into sugar
Enters the bloodstream
Either not enough insulin released or body can't use insulin properly.
Sugar keeps building up in the blood. Finally it spills over into the urine and leaves the body

WHAT IS ACETONE? Acetone is an acid material made from body fats. When there is not enough insulin in the body to convert sugar to energy, then fat is burned by the body in an effort to give the person energy. Acetone may indicate a serious situation, indicating too little insulin usually.

Study the picture of the equipment needed to test your urine for sugar and acetone. You will note the Clinitest tablets are used for testing the presence of sugar and Acetest tablets are used for testing the presence of acetone in urine.

III. Now, from the box of items supplied, select the items you will need for sugar and acetone testing and make a check mark on your answer sheet. Instead of urine, a "practice" bottle of glucose is included.

Check your equipment against the pictures. Do you have everything you need? If so, then move on to the procedure.

IV. Now that you know the items you will need for this test, it is time to actually run the test. Follow the instructions below:

TESTING FOR SUGAR: Two-Drop Method

A. Clinitest: *(Note: When tablet is blue, due to moisture, do not use it. Always keep bottle tightly capped to prevent this.)

1. Place 10 drops of tap water in the test tube.
2. Remove excess water from dropper.
3. Place 2 drops of urine (or glucose solution) in the test tube. Add carefully with tube and dropper upright so that urine falls directly into the water.
4. Open the Clinitest bottle or package, and drop one tablet into the test tube. (DO NOT touch the tablet). Tap tablet into cap of bottle and then drop directly into test tube.
5. Hold test tube near the top as the bottom will burn! Let the solution boil until it stops. DO NOT shake during reaction.
6. Wait exactly 15 seconds (count to 15, or use a clock or watch) and compare with the special Clinitest color scale provided for two-drop method.
7. Hold the test tube close to color chart. The color of the solution in the test tube indicates the amount of sugar in the urine.
8. Record the result on your Answer Sheet and in your Diabetic Record Book. (For this exercise, use either of the readings above or below the chart color most nearly matching your tube of tested urine. Your doctor or nurse will tell you which method of recording they prefer.)

NOW PROCEED TO THE ACETEST TEST.

Test for Acetone:

1. Place an Acetest tablet on a small piece of white paper.
2. With the medicine dropper, place a drop of urine (or glucose solution) on the tablet.
3. Wait exactly 30 seconds.
4. Compare the color of tablet with the color chart (Acetest).
5. Record the results in your Diabetic Record Book.
6. Wash the medicine dropper and test tube. Replace materials in your kit.

That wasn't hard, was it? But, practice makes perfect! Repeat the same procedure using some of your urine.

When you feel comfortable with the Sugar and Acetone procedure, proceed to the self-check on the next page, enlisting the help of a nurse to check the accuracy of your demonstration at Question 4.

SELF-CHECK

1. The Sugar and Acetone test should be done: (one correct answer)

   a. after each meal
   b. before each meal and at bedtime
   c. once a day before breakfast
   d. late afternoon

2. Write a statement explaining the procedure in obtaining the A specimen and B specimen.

3. List below the items you will need to perform the Sugar and Acetone test on Urine.

4. Correctly demonstrate each step of the Sugar and Acetone test to the nurse or instructor.

5. Check the appropriate blocks. This self-instructional package was:

Clear			Confusing
Important			Unimportant
Useful			Not Useful

6. Do you now feel that this test is easy to perform? YES _____ NO _____

7. Would you recommend this instructional package to a friend who needs to learn this procedure?

   YES _____ NO _____

ANSWERS TO POST-TEST

All the answers and the procedure will either be correct or incorrect. If correct - congratulations! If any part is incorrect, please discuss this with the nurse instructor.

1. B

2. Empty the bladder 1/2 hr.- 1 hr. before meals. Discard this "A" specimen urine. Urinate again in 1/2 hr. - 1 hr. and test this "B" specimen. Record results in record book.

3. Equipment needed:

eye dropper	color charts (Clinitest and Acetest)
test tube	white paper
Clinitest tabs	glucose water or urine
Acetest tabs	container with water

4. Clinitest steps:

_____a. Place 10 drops water in test tube.
_____b. Remove excess water from dropper.
_____c. Place 2 drops urine in test tube.
_____d. Place Clinitest tablet in test tube without touching tablet.
_____e. Wait 15 seconds after it stops boiling.
_____f. Check immediately with Clinitest color chart.

Acetest steps:

_____a. Place Acetest tablet on white paper.
_____b. Drop one drop urine on tablet.
_____c. Check color in exactly 30 seconds with color chart.
_____d. Record results.

5., 6., 7. We hope these answers will be positive. If not, let's talk about the problem.

ANSWER SHEET FOR POST-TEST

1. Circle one: a. b. c. d.

2.

3.

4. Correctly demonstrated?

Clinitest _____ YES _____ NO

Acetest _____ YES _____ NO

5.

Clear			Confusing
Important			Unimportant
Useful			Not Useful

6. _____ YES _____ NO

7. _____ YES _____ NO

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LEARNING TO GIVE INSULIN

By

Ruth Bockius

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TITLE OF PACKAGE:	Learning to Give Insulin
AUTHOR:	Ruth Bockius, R.N.
INSTITUTION:	Phoenix (Ariz.) General Hospital
INTENDED STUDENT:	Diabetic patients or families
ESTIMATED WORKING TIME:	20 minutes
MATERIALS NEEDED:	Insulin syringe for 100 U insulin (U100) - (labeled Insulin syringe); vial of sterile water; alcohol wipes; an orange

FIELD TEST COPY

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INTRODUCTION

You or a loved one has been told you have diabetes and must have insulin injections. This packet will teach you the basics of insulin injections and enable you to give a practice dose.

As you continue through the packet, you will define the word "sterile", and list two reasons for sterility. You will fill a syringe and give a make believe dose of insulin to an orange.

PRACTICE EXERCISE #1

When an article or solution is called sterile, it means that there are no germs or bacteria, either friendly or unfriendly, growing on the article or in the solution.

Therefore, "sterile" means "free from all living microorganisms."

If you are not sure you understand, look up the words "sterile," "organisms," "germ" and "bacteria" in the dictionary.

Practice Question #1

Write what the word "sterile" means to you.

OE 29

Feedback

If you answered something like, "Sterile means free from any growth, at all," you are correct. You're learning!

PRACTICE EXERCISE #2

If strange germs get into your body or your bottle of insulin, they may cause you trouble. An unfriendly germ may cause an infection or sore at the injection site. Strange organisms in the medicine may cause it not to work properly.

Practice Question #2

Write 2 reasons why you should keep the injection sterile:

1) For your body _____

2) For your medicine _____

Feedback

Did you remember that unsterile equipment might give you an infection?

Did you mention that the insulin might not work properly?

Good for you!

PRACTICE EXERCISE #3

Now look at the insulin syringe. Take it out of its container and study the markings on it. (Leave the cover on the needle so you don't accidentally stick yourself.)

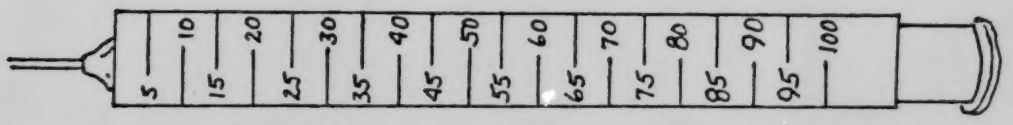
Draw the plunger back to the 40; you would have 40 units of insulin.
Draw the plunger back to the 45; you would have 45 units of insulin.

Practice Question #3

On the diagram below:

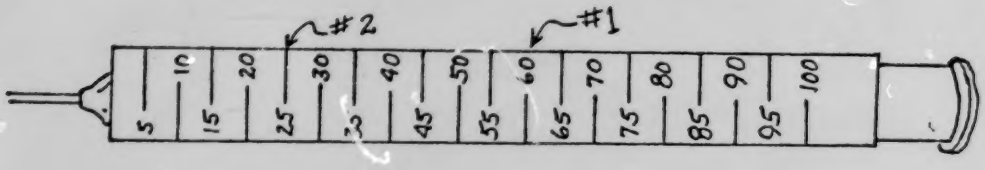
Put an arrow where 60 units of insulin would be. Mark it #1.

Now put an arrow where the 25 units of insulin is. Mark it #2.



Feedback

Did you mark your diagram just like this?

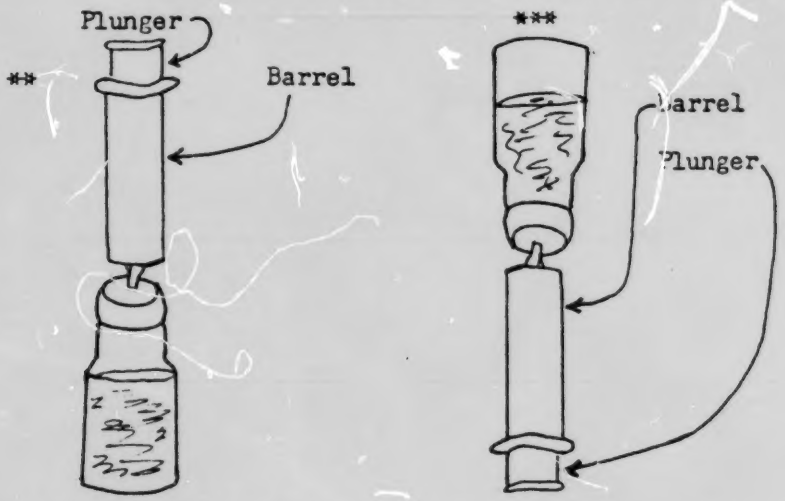


If you did, good! Go on to the next step.

PRACTICE EXERCISE FOR OVERALL OBJECTIVE

1. Wipe the rubber cap of the insulin bottle with an alcohol wipe.
2. Pick up the syringe, remove needle cover, and draw the plunger back.*

   * (Don't allow the needle to get against ANYTHING!!)
3. Stick the needle through the rubber stopper and push the plunger all the way in. This forces the air from the syringe into the bottle.**



4. Turn the bottle upside down and pull the plunger back PAST 45. Now push it SLOWLY exactly to the 45 mark.***
5. Withdraw the needle. Replace needle cover. AGAIN - WATCH IT! Don't touch the needle!!
6. Wipe an area of the orange to be injected with an alcohol wipe, lay it down. You are ready!
7. Remove the needle cover - lay it aside. Hold syringe in right hand, hold the orange in your left hand. (If you're left-handed, put the syringe in your left hand, the orange in your right.)
8. Now quickly insert the needle into the orange. Inject at an angle.

9. Pull the plunger back just a hair. (On yourself, this will see whether you are in a blood vessel.)
10. Now SLOWLY inject the medicine. Pick up the alcohol wipe and hold it against the orange and QUICKLY withdraw the needle.
11. Replace cover on needle.

Practice Question #4

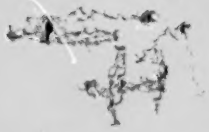
Draw up 45 units from the vial. Now inject the dose into the orange.

Did you:

Wipe the bottle cap?	Yes ____ No ____
Keep the needle from touching anything before it was put into the orange?	Yes ____ No ____
Give 45 units?	Yes ____ No ____
Wipe the orange with alcohol before injecting?	Yes ____ No ____
Get all the air out of the syringe?	Yes ____ No ____
Pull back on the plunger before injecting?	Yes ____ No ____
Put the needle in at an angle?	Yes ____ No ____

If you answered yes to all these questions, you're doing great. You're ready to give yourself an injection!

Please turn the page and test your memory with the short Post-Test.



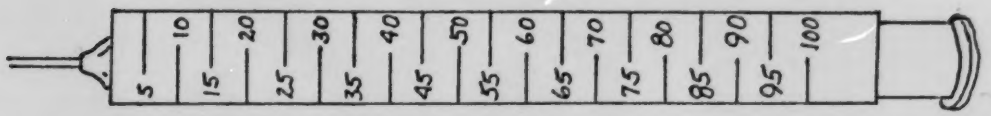
POST-TEST

1. Tell in your own words what the word "sterile" means.

2. List two reasons why sterility is important.

3. Pretend your prescribed dosage of insulin is 80 U. Put an arrow on the drawing showing how much insulin you will draw up. Mark it #1.

   How about 45 U? Mark it #2.



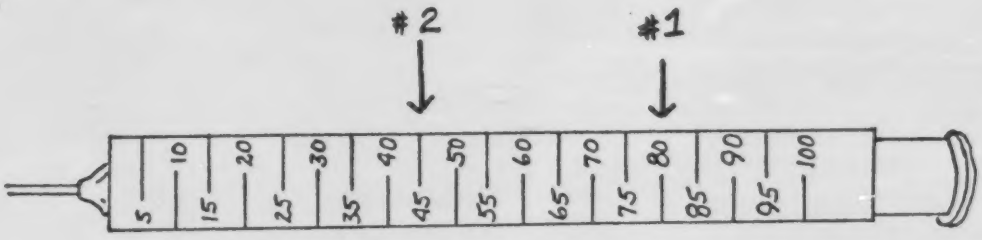
4. Draw 35 U of insulin and give it to the orange.

ANSWERS TO POST TEST

1. Sterile means free from all organisms.

2. Germs may cause infection to your body. Germs may cause your medicine not to work properly.

3.



4. Did you:

Wipe cap with alcohol?	Yes X	No ____
Keep medicine and syringe sterile?	Yes X	No ____
Wipe orange with alcohol?	Yes X	No ____
Expel all air?	Yes X	No ____
Draw back on the plunger?	Yes X	No ____
Give 35 units?	Yes X	No ____
Inject at an angle?	Yes X	No ____

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DIABETIC MEAL PLANNING

by

Bonnie Johnson, R.D., A.D.A.

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TITLE OF PACKAGE:	Diabetic Meal Planning
AUTHOR:	Bonnie Johnson, R.D., A.D.A.
INSTITUTION:	Caro (Mich.) Community Hospital; Dales Hospital
INTENDED STUDENTS:	Newly diagnosed diabetics
ESTIMATED WORKING TIME:	30 minutes
MATERIALS NEEDED:	Meal plan; copy of Exchange Lists (Newest revision from American Diabetes Association recommended); Optional: Drawings of food models depicting exchanges or those from dairy council.

FIELD TEST COPY

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INTRODUCTION

So you have just learned that you are a diabetic. You will be learning many things about keeping your diabetes controlled. Keeping your diabetes controlled means keeping your blood sugar at near normal levels. Your diet is the most important tool for keeping your blood sugar within the recommended level.

The Diabetic Diet is based on "Exchanges." The number of exchanges allowed is stated in your meal plan. Your meal plan is the key for writing diabetic menus. Knowing how to plan daily menus makes the important task of eating correctly easier.

When you are able to write menus accurately you'll be able to enjoy meals with more variety and with planned menus you will be able to make food purchases more wisely.

PRACTICE EXERCISE #1

The diabetic diet is one of the most important tools in controlling your diabetes. The prescription given you by a physician or dietitian has been determined after careful consideration of such factors as your age, physical activity, and your ideal weight. If you are a patient in the hospital, your diet prescription may be written on your chart (medical record). From there it will be communicated to the dietitian for appropriate follow-up. Many diabetics must follow a lower calorie regimen until weight loss is accomplished. Frequently a diabetic person has physical problems caused by Diabetes Mellitus, warranting the need for limited intake of sodium or modification of fat.

Authorities who compiled the most recent revision of the Exchange Lists encourage all diabetics to choose low-saturated-fat foods in meat, milk, and fat lists. These foods are printed in bold type.

PRACTICE QUESTION #1

What information will you need before you will be able to plan menus for your diabetic diet?

FEEDBACK

I will need a written form stating the diet in terms of calories plus any other restrictions if necessary. If I am in the hospital such a form may be deleted in lieu of the patient chart.

PRACTICE EXERCISE #2

Perhaps you have seen the diet of a friend or relative who is a diabetic or have seen books which have illustrated diabetic diets at various calorie levels. Do not think that you may use any of these. Your diet must be prescribed for you. Just as medication must be taken in specific amounts, your food intake must be taken in controlled amounts. Following your meal plan accurately will assure taking the prescribed number of calories and other dietary components.

Although meal plans are fairly standard for all diabetic diets, they may be changed to meet individual needs and lifestyles. A typical reason for changing a standard meal plan is a dislike of milk. When milk is omitted from the meal plan, other foods must be substituted to replace the protein, fat, and carbohydrate content of the milk exchanges. A professional dietitian will be able to assist you in changing your meal plan.

PRACTICE QUESTION #2

The meal plan used should be correct and appropriate for the person following it. What are two factors which will determine whether your meal plan is correct and appropriate for you?

FEEDBACK

1) If it is the meal plan for the number of calories stated in my diet prescription.

2) If it is individualized to my needs.

The "Meal Plan" or "Menu Guide" is the list of foods which you must eat everyday at your meal times. This is your tool for planning your menus. The Meal Plan is expressed in terms of Exchanges. Remember to eat your meals at a regular time and do not skip meals.

DAILY MENU GUIDE

	BREAKFAST
1	fruit exchange (List 3)
1 ½	bread exchanges (List 4)
1	meat exchange (List 5)
2	fat exchanges (List 6)
1	cup 2% milk (List 7)
	LUNCH
2	meat exchanges (List 5)
2	bread exchanges (List 4)
	Vegetables - as desired(List 1)
1	fruit exchange (List 3)
2	fat exchanges (List 6)
	DINNER
3	meat exchanges (List 5)
2	bread exchanges (List 4)
	Vegetable(s)-as desired(List 1)
1	vegetable exchange (List 2)
2	fat exchanges (List 6)
	BEDTIME FEEDING
1	cup 2% milk (List 7)
½	bread exchange (List 4)
	OR
1	meat exchange (List 5)
1	bread exchange (List 4)

These sample menus show some of the ways that the exchange lists may be be used to add variety to your meals.

BREAKFAST	
Orange juice	1/2 cup
Cereal, dry	3/4 cup
Toast	1/2 slice
Egg	1
Bacon, crisp	1 slice
Margarine	1 tsp.
Milk, 2%	1 cup
LUNCH	
Cheese	2-1 oz. slices
Bread	2 slices
Tomato salad	As desired
Apple	1 small
Mayonnaise	2 tsp.
DINNER	
Chicken, baked	3 oz.
Potatoes, mashed	1/2 cup
Bread	1 slice
Salad from List 1 vegetables	as desired
Peas	1/2 cup
French dressing	1 tbsp.
Margarine	1 tsp.
BEDTIME FEEDING	
Milk, 2%	1 cup
Graham cracker	1 square
Roast beef	1 oz.
Bread	1 slice
Mustard	As desired

PRACTICE QUESTION #3

In your own words describe "Meal Plan" or "Menu Guide."

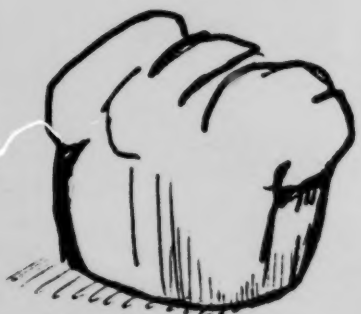
FEEDBACK

A Meal Plan is the list of foods I may eat at meals and snacks each day.

An exchange list is a group of foods which contain approximately equal amounts of calories, carbohydrates, proteins, and fats. The six exchange lists include milk, vegetables, fruit, bread, meat and fat.

One portion or serving of any food in each list is an exchange. Each exchange is expressed in an easily measured or purchased unit. An exchange may be thought of as a substitution as the exchanges or units may be substituted one for another within a list.

FAT exchange
1 tsp. Butter



Bread exchange
1 Roll 2" diam.

MEAT Exchange
2oz roasted chicken

Fruit exchange
½ small banana

PRACTICE QUESTION #4

In your own words describe what an exchange list is and what an exchange is.

FEEDBACK

An exchange list is a group of foods which contain approximately equal amounts of calories, proteins, fats, and carbohydrates.

An exchange is one serving or portion in each list.

PRACTICE EXERCISE #5

You will be able to incorporate much variety in your diet by using the exchange lists to plan menus. Remember that exchanging may be done only within a list and not from one list to another list. When the meal plan calls for two exchanges from one list, double the amount of one exchange or select two different items in the amounts listed for exchange. If the meal plan calls for three items, then triple the amount of one of the items or select three different items in the amounts listed as one exchange.

PRACTICE QUESTION #5

Write a breakfast menu using your meal plan. You will need to write in the number of exchanges shown on your meal plan in the blanks on the left.

_____ Fruit Exchange

_____ Meat Exchange

_____ Bread Exchange

_____ Fat Exchange

_____ Milk Exchange

Write a bedtime snack menu using only free food choices. (List two or three items.)

FEEDBACK

A sample breakfast menu using the meal plan shown:

1	fruit exchange	1/2	cup orange juice
1	meat exchange	1	poached egg
1	bread exchange	1	slice toast
1	fat exchange	1	teaspoon margarine
1	milk exchange	1	cup milk

Bedtime Snack:

"Free"		1	dill pickle
"Free"		1	cup sugar free lemonade

PRACTICE EXERCISE FOR OVERALL OBJECTIVE

Now you should be ready to write menus for an entire day. When making your choices, consider foods which are convenient to prepare for the entire family. Remind family members that they will be eating the right foods at the right times also and this will help them maintain good health. Note that the exchange lists have been expanded to include many popular food items. Let me caution you against counting calories. If you follow your meal plan and select the right kinds and amount of various exchange, you will automatically consume the prescribed number of calories.

Eventually you will be able to combine foods and accurately substitute the ingredients for the appropriate exchanges. Ask a dietitian for assistance when you feel confident to attempt this.

PRACTICE QUESTION

Using your meal plan, write menus for an entire day. Check yourself, then attempt to write menus for a week. To do this, obtain a standard 8½ x 11" sheet of paper. On the left side of the paper, write the meal plan for breakfast, then lunch and followed by dinner. If a bedtime snack or other snack will be consumed, inject the meal plan for this in the appropriate place. On the right side of the paper write menus for the meals and snacks. Check your menus frequently to see that you have written the accurate portion size for the exchanges allowed. The food models are available to give you ideas for menus.

FEEDBACK

When you feel confident that your menus match the meal plan and the exchange materials provided you with this package, ask the dietitian or nurse to check them out.

Her approval of your menu writing means that you have fulfilled our objectives for this learning unit - to be able to write menus accurately so that you're able to enjoy meals with more variety and to make food purchases more wisely.

Please take the Post-Test on the next page to test yourself further on what you've learned today.

POST-TEST

1. True or False

   a. _____ The Diabetic patient may follow a calorie level diet of his own choosing.

   b. _____ The diet prescription always includes protein, fat, and carbohydrate content.

   c. _____ Frequently the Diabetic diet has the added restrictions of animal fat and/or sodium.

2. Completion

   The Diabetic must have a meal plan which will comply _____ and has been _____.

3. Define:

   Meal Plan (or Menu Guide)

4. Define:

   "Exchange List"

   "Exchange"

5. Match items in Column I with the correct answer in Column II.

Column I	Column II
1 fruit exchange	3 oz. roast beef
1 meat exchange	1 slice crisp bacon
free food	1 cup whole milk
1 vegetable exchange	1/2 cup mashed potatoes
1 bread exchange	1/2 cup green beans
1 fat exchange	1 teaspoon margarine
3 meat exchanges	1 oz. slice turkey
1 milk exchange	1 cup strawberries
1 fat exchange	1 cup black coffee

ANSWERS TO POST-TEST

1.

a. F

b. F

c. T

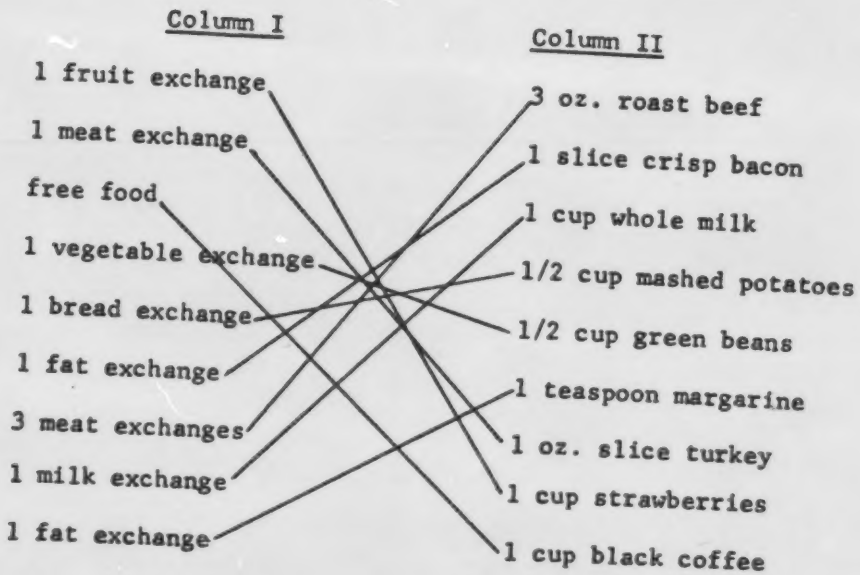
2. comply with the prescription and which has been individualized for his personal preferences and life style.

3. Meal plan is the list of foods, expressed in exchanges, which the Diabetic must eat everyday.

4. An Exchange List is a group of foods approximately equivalent in calories, protein, fat, and carbohydrate.

   An Exchange is one serving or portion of any food from any exchange list.

5.



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A PROJECT OF THE LEAGUE FOR INNOVATION IN THE COMMUNITY COLLEGE

PREPARING YOUR FIRST MIXED DOSAGE OF INSULIN AND DEMONSTRATING THE TECHNIQUE OF GIVING THE INJECTION

By

Anne M. Lorentzen, R.N.

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TITLE OF PACKAGE:	Preparing Your First Mixed Dosage of Insulin and Demonstrating the Technique of Giving the Injection
AUTHOR:	Anne M. Lorentzen
INSTITUTION:	Saginaw (Mich.) Visiting Nurse Association
INTENDED STUDENTS:	Consumer
ESTIMATED WORKING TIME:	30 minutes
MATERIALS NEEDED:	Insulin; alcohol wipe; insulin syringe; hand wash wipe
REVISED:	Nov. 1, 1977

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INTRODUCTION

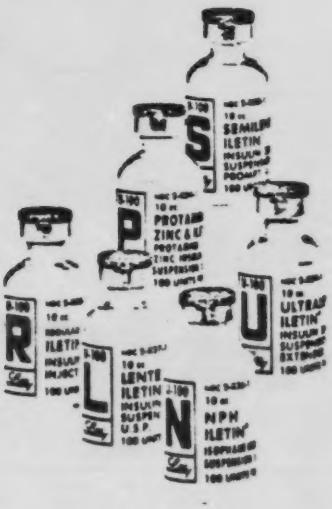
Your doctor has decided you need to take an injection of insulin every morning to help in the control of your diabetes.

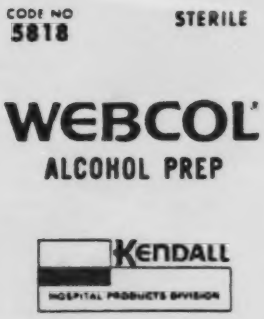
Your dosage will be of two different kinds of insulin mixed into one syringe before injection into the skin.

Here is a step-by-step instructional package to take you through filling the syringe and injecting the insulin into yourself.

By the time you finish this unit, you will be able to assemble the needed equipment, identify the parts of a syringe, the parts of an insulin vial, and the areas of the body that are used to receive daily insulin injections.

To prepare for the daily insulin injection you need to have these necessary items available. You will need a syringe and needle that has a measuring scale that matches the strength of insulin you will be using. Alcohol wipes are needed to cleanse the tops of the insulin bottles and also to cleanse the area of skin you are going to use for the injection. The bottles of insulin will be as prescribed by your doctor.





PRACTICE QUESTION #1

You will need a syringe with needle, alcohol wipes and insulin to prepare your daily injection.

_____ True _____ False

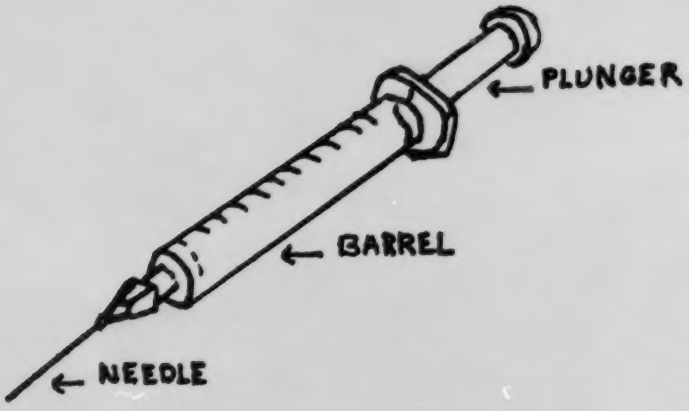
FEEDBACK

TRUE

and now that you have gathered all the needed items to prepare and give your daily insulin, syringe with needle, alcohol wipes and bottles of insulin, if you keep every thing together this is one step in your every day care you can forget about.

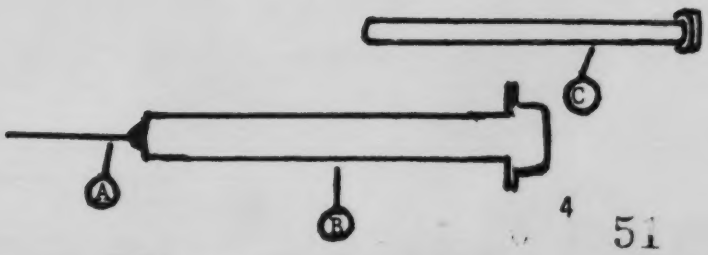
The syringe is made up of three main portions and before practicing the filling of the syringe they need to be cleansed. The needle is the portion to be pushed into the rubber stopper on the insulin bottle and later through the skin. The barrel of the syringe is the area that will hold the measurement of insulin you will be taking every morning. The plunger is the portion that helps you fill the barrel to the amount of insulin you will need.

Please use the picture of the syringe to identify the various parts.



PRACTICE QUESTION #2

Identify the parts of the syringe.



A. _____

B. _____

C. _____

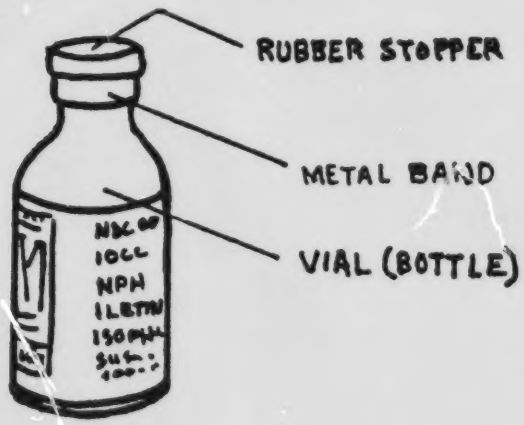
FEEDBACK

The needle on this type of syringe is permanently attached to the barrel. The plunger is movable so you can withdraw the correct amount of insulin for your daily injection.

You are correct if you labeled A the needle, B the barrel, and C the plunger.

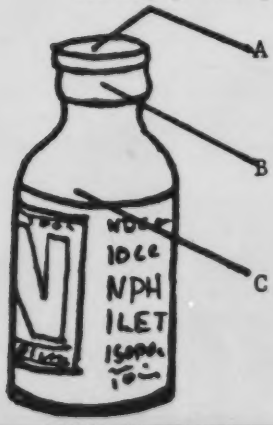
Your bottles of insulin will have a label indicating the kind of insulin it contains and the strength of the insulin. Your doctor will decide the right kind of insulin and the amount needed to help in the control of your diabetes.

The vial (bottle) is made up of a clear glass bottle that has a rubber stopper held in place by a metal band.



PRACTICE QUESTION #3

Identify the parts of the bottle of insulin



A. _____

B. _____

C. _____

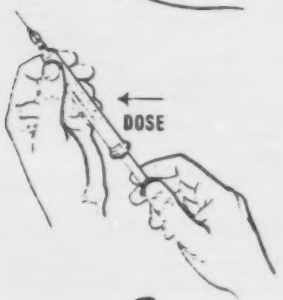
FEEDBACK

The vial or bottle is of clear glass so you are able to see the small particles of insulin in the solution. The rubber stopper is the area you cleanse with alcohol before putting the needle through it. A metal band is used to hold the rubber stopper in place.

You answered correctly if you labeled A the rubber stopper, B the metal band, and C the vial or bottle.

preparing the Insulin dose

1. If any of the Lente® Insulins, NPH Insulin, or Protamine Zinc Insulin (all of which are cloudy) is used, mix thoroughly—not by shaking but by rotating the vial, in order to prevent the formation of froth.



2. Draw air into syringe equal to Insulin dose to be withdrawn.

3. Clean vial stopper with cotton dipped in alcohol. Insert needle through center of rubber stopper. Inject air into vial.

4. Invert bottle and syringe. Withdraw specified dose.

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60-PC-7950-0 PRINTED IN U.S.A. 001001-127230 OCTOBER, 1970

Using the equipment provided follow each step to fill the insulin syring to your correct dosage. You will be using Lente and UltraLente insulin in the U – 100 strength and an insulin syring with U – 100 measurement on the barrel. The insulin bottles are rolled in the palms of your hands to mix the suspended particles of insulin prior to the withdrawing of insulin from the bottles. Your daily dose is UltraLente 10 units and Lente 20 units.

A. Read steps #1 through #4 completely. Using the syringe with needle attached, alcohol wipe, hand wash wipe and simulated bottles of insulin, demonstrate your understanding of these instructions:

1) Wash your hands using the wipe.
2) Roll both bottles of insulin to mix thoroughly.
3) Remove the alcohol wipe from the packet and cleanse the tops of both insulin bottles.
4) Remove the protective covers from the plunger and needle ends of your disposable syringe.

PRACTICE QUESTION #4
(Second person to do the check sheet.)

a. Were you able to remove the needle cover without touching the needle?

b. While rolling the bottles of insulin were you able to mix without causing foam to form on the surface?

B. Read steps #5 through #8 completely. The air is put into the bottle to replace the amount of insulin you will be withdrawing to maintain the inside pressure and to make it easier to control the plunger for accuracy in with-drawing the needed amount of insulin. These steps are followed with the vial sitting on the table.

Follow each step using the syringe and bottles of simulated insulin:

5) Measure 20 units of <u>air</u> into the syringe by pulling the plunger down to the twenty marking on the syringe.
6) Push the needle into the rubber stopper on the bottle of <u>Lente</u> insulin. Push in the air by pushing down on the plunger.
7) Remove the needle from the bottle, <u>empty</u>.
8) Measure 10 units of <u>air</u> into the syringe and push the needle into the rubber stopper of the bottle of <u>UltraLente</u>. Push the air into the bottle.

4. c. Were you able to push the needle into the rubber stopper without touching the needle on the metal band?
d. Was the syringe removed from the vial of Lente insulin without withdrawing any insulin?

Read steps #9 through #15 completely. Air bubbles found in the syringe will not cause harm to your body but air bubbles take up space and you do not get the correct amount of insulin. All bubbles are to be gone before going back to pick up the 20 U of Lente. The total amount of insulin in the syringe will be the amount of UltraLente added to the Lente or as your dosage is, 10 U Lente and 20 U UltraLente, you will have 30 U total.

9) Turn the bottle with the syringe in place upside down with the bottle straight above the syringe.

10) Pull the plunger half way down the barrel to rapidly fill the syringe with insulin.

11) Check the syringe for clear areas of air and if found return all the insulin back into the bottle by pushing the plunger upward.

Repeat steps #10 and #11 until you have measured 10 units of UltraLente insulin.

12) Carefully withdraw the bottle from the syringe while you keep the syringe in an upright position.

13) Turn the bottle of Lente insulin upside down and insert the needle through the rubber stopper. Carefully pull the plunger back stopping exactly on 30 units.

(10 units UltraLente and 20 units Lente = 30 units of insulin total)

14) Remove the needle from the bottle still holding the syringe upright.

15) Lay the syringe on the edge of the table so the needle is not touching any surface.

4. e. Were you able to hold the bottle and syringe in an upright position?

f. Were you able to identify air bubbles when found in the syringe?

4. g. When you went back to pick up the Lente insulin were you able to avoid the UltraLente from leaking into the Lente bottle? (You will see yellow in the Lente bottle.)

h. What was the total dosage of insulin in the syringe ready for injection?

FEEDBACK

If the needle is touched while preparing it, you must throw it away and start over. If used, you will contaminate all the insulin in the bottle and cause infection under the skin.

Avoid making air bubbles while rolling the bottles of insulin and perhaps you will avoid them later in the syringe.

If you should hit the metal band when trying to insert the needle into the rubber stopper you may bend or dull the needle.

The Lente insulin is withdrawn after you have withdrawn the Ultra Lente insulin.

See the illustration at the beginning of Exercise 4 as to the correct way to hold the bottle and syringe. Hold it in a way comfortable to you.

Air bubbles will look like clear areas any where in the barrel of the syringe. If you were to have air bubbles in the syringe, you will not have 30 units of insulin because air is taking up some of the space for the insulin.

Your doctor wants you to take a combination of Lente 20 units and UltraLente 10 units every morning before breakfast. The total amount of insulin would be 30 units.

There's a great deal to learn in this part of the exercise. If you don't feel comfortable with the technique yet, review Pages 8-12 before continuing.

Daily rotation of the site of injection is for three important reasons. If the same tissue area is used over and over you may develop indentations, excessive fat buildup or thickened skin.

If tissue is damaged in any of these ways, the absorption of insulin can be slowed and therefore you don't get the use of the insulin your doctor expects for you.

By switching of the injection site every day these problems are avoided. See the following page for a picture of the areas of the body that can be used for the injection.

PRACTICE QUESTION #5

(1) List three areas that would be the easiest to give your own injection.

a. _____

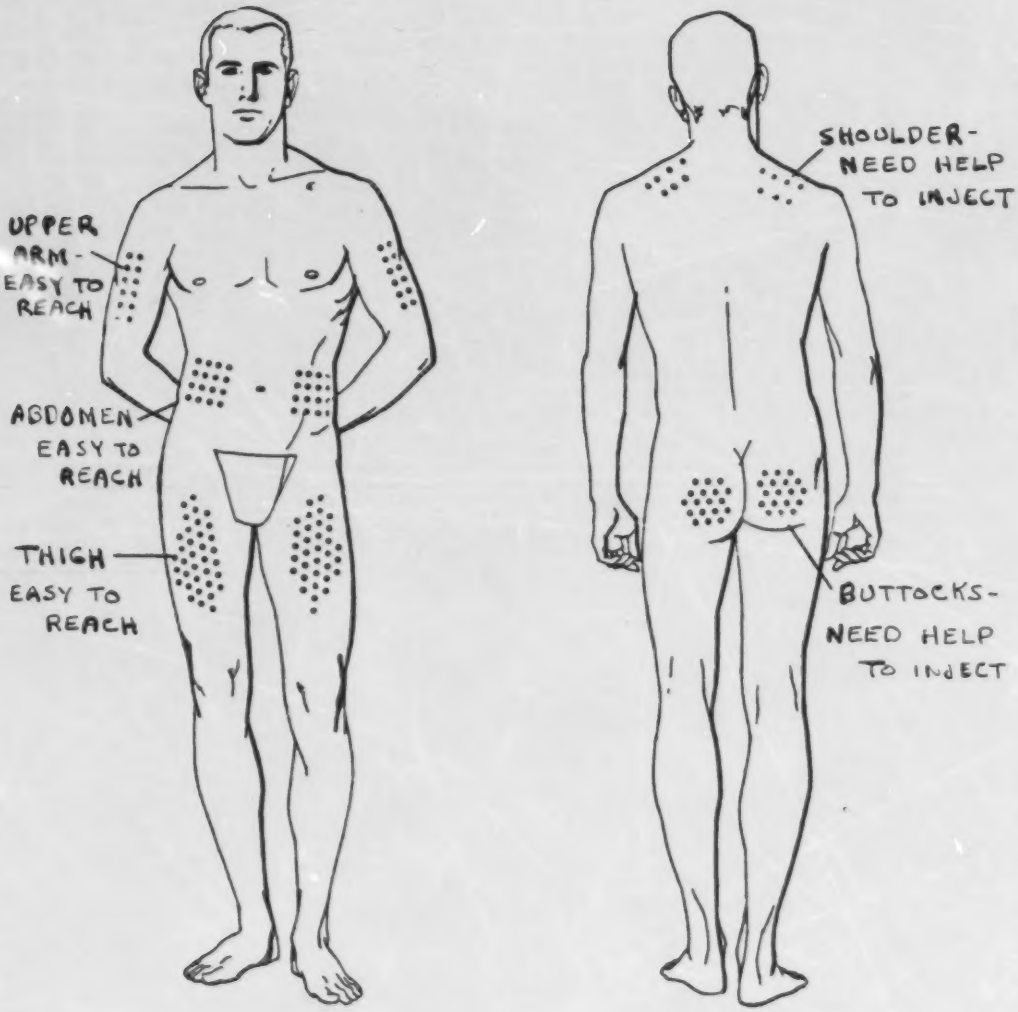
b. _____

c. _____

(2) Can you do damage by using the same area for all your daily injections?

_____ yes _____ no

sites of Insulin injections
–change daily


UPPER ARM - EASY TO REACH
ABDOMEN EASY TO REACH
THIGH EASY TO REACH
SHOULDER - NEED HELP TO INJECT
BUTTOCKS - NEED HELP TO INJECT

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FEEDBACK

The easiest areas for you to give yourself an injection is the tops of your thighs and across the abdomen. As you become more familiar with holding the syring you will be able to use the upper arms. Perhaps your spouse or friend will help you include the shoulders and buttocks into the rotation schedule.

YES, the skin areas can be damaged by using them over and over. If damaged your insulin isn't as effective in the control of your diabetes.

You've filled the syringe to your daily insulin dose and know where you can safely give the injection. It is time now to cleanse the skin with alcohol, pinch up the skin to receive the needle and push the needle in. (Use the simulated tissue patch with your equipment.)

First hold the syringe as if you were going to hold a pen or pencil so the finger doesn't accidently push the plunger down before you have the needle into the skin.

Now push the needle all the way straight into the pinched-up skin. Let go of the skin and use that hand's first finger to push the plunger all the way in. Quickly withdraw the needle from the skin and again use the alcohol wipe to wipe off the skin. (See the following page for an illustration of the needle into the tissue.)

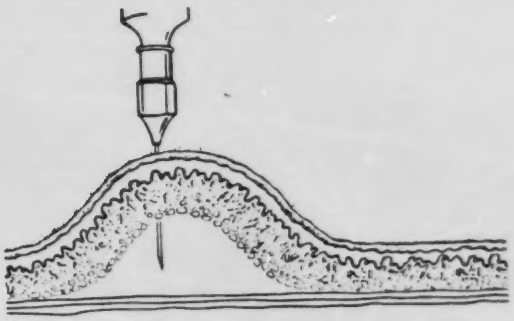
You've just given your first injection!!

PRACTICE QUESTION #6

(1) The syringe is held like a _____ during the process of giving your injection.

(2) Why do you wipe the skin with alcohol prior to giving the injection?

injection of Insulin dose



1. Wipe site of injection with cotton swab dipped in alcohol.

2. With one hand, pinch up skin at injection site. Place syringe perpendicularly to the skin and quickly insert needle for its entire length in order to insure injection of sufficient depth (see illustration). The more rapidly the needle is inserted, the less the pain will be.

3. Inject Insulin dose.

AFTER YOU INJECT

1. Hold skin firmly near the site of injection with cotton dipped in alcohol. Withdraw needle, maintaining original position of syringe.

2. Gently wipe site of injection with alcohol.

Lilly

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FEEDBACK

The insulin syringe is held as a pencil or pen so you don't accidently lose any of your daily dose before the needle gets into the skin.

The skin is cleansed with alcohol before you give yourself the injection.

OVERALL OBJECTIVE

Part of your every day routine will be taking an injection of insulin before breakfast. The sooner you start establishing a routine, the sooner it becomes part of your every day habits.

The syringe must be carefully filled so you have the combination of dosage your doctor has decided will be useful in controlling your diabetes.

The area of your body you give the injection into will be helpful in the absorption of the insulin. Change the area (site) every day.

PRACTICE QUESTION

(1) Your daily injection of insulin is to be given at what time of day?

(2) Who decides what combination and dosage of insulin you require?

(3) Is it necessary to remember where you last gave an injection?

FEEDBACK

Prior to breakfast you will take your daily injection and then can forget about it for the rest of the day.

Your doctor will decide what insulin dosage you require to control your diabetes after doing various laboratory procedures.

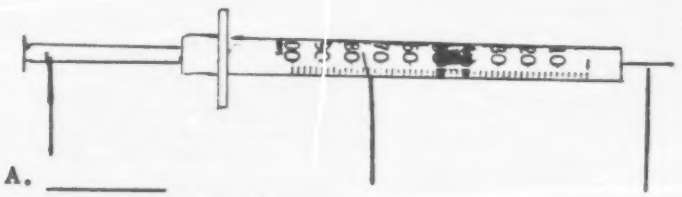
Change your site of injection every day so the skin is not damaged.

POST TEST

1. To prepare an injection of insulin you will need a syringe and needle, alcohol wipe and bottles of insulin.

_____ True _____ False

2. Label the barrel, needle and plunger on the following picutre.

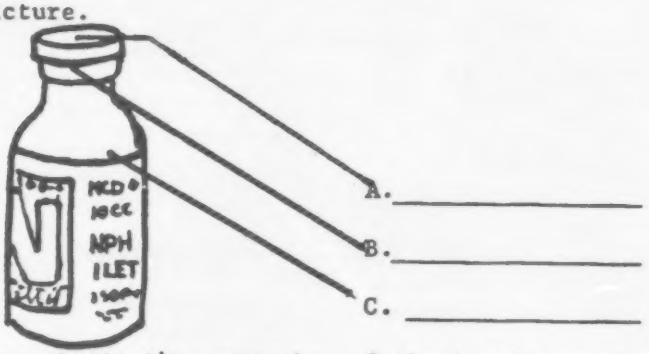


A. _____

B. _____

C. _____

3. Label the vial, metal band and rubber stopper on the following picture.



A. _____

B. _____

C. _____

4. Demonstrate the preparing of the insulin syringe containing your combined dosage of insulin.

(Refer to steps #1 through #15 if needed.)

5. Indicate (x) the three most common areas for insulin injection sites:

_____ A. buttocks

_____ B. upper arms

_____ C. shoulder area

_____ D. abdomen

_____ E. top side of thighs

6. Demonstrate the technique of giving the injection using the patch of simulated tissue for this demonstration.

7. Prior to breakfast every morning you are to take the injection of insulin.

_____ True _____ False

8. Who decides the kind of insulin, combination of insulins and amount of insulin to be given every day?

_____ Doctor _____ Yourself

POST TEST ANSWERS

1. True
2. A. plunger
   B. barrel
   C. needle
3. A. metal band
   B. rubber stopper
   C. vial or bottle
4. observe the demonstration
5. B, D, E
6. observe the demonstration
7. True
8. Doctor

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PREPARING INSULIN INJECTIONS

By

Verdell Washington

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TITLE:	Preparing Insulin Injections
AUTHOR:	Verdell Washington
INSTITUTION:	Santa Fe Community College, Dallas, Texas
INTENDED STUDENTS:	Diabetic patients
ESTIMATED WORKING TIME:	30 minutes
MATERIALS NEEDED:	Vial of U100 NPH insulin; U100 syringe; 25 gauge needle; alcohol swab

FIELD TEST COPY

NOTE: Physician or nurse may wish to substitute the strength and type of insulin required by individual patient and the corresponding syringe for materials listed above.

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THIS PACKAGE IS PREPARED FOR THE DIABETIC PATIENT

Diabetes is one of the leading diseases in the U.S. today. It strikes old and young alike. Approximately half of the persons over 50 years of age will develop diabetes by the age of 65. Many babies are born with diabetes. A large number of children younger than 15 have the disease. A large proportion of diabetic children had diabetic parents and grandparents as well. Diabetes affects overweight persons, too.

Although many persons are affected by this disease, they can live normal, happy lives if they adhere to treatment prescribed by their physicians. Often included in that treatment is the taking of daily insulin injections. This treatment is not without its problems. One such problem is preparing the wrong dosage of insulin. A second problem encountered is infection owing to the use of contaminated equipment.

This self-instructional unit is aimed at teaching you, the diabetic patient, to use aseptic (sterile) technique in measuring insulin correctly, thereby preventing infection and the administration of the wrong dosage.

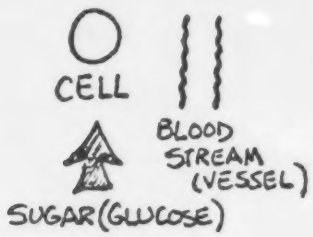
This package will enhance your understanding by defining diabetes, insulin, and why diabetics need to take insulin. Included are explanations and questions on the types and strengths of insulin and the equipment needed for injection.

Successful completion of this unit will help you to demonstrate insulin measurement and proper techniques for its administration.

PRACTICE EXERCISE 1

Diabetes is a disease condition that prevents sugar (glucose) from entering the body cells.

It is a disease condition in which the cells of the body are unable to use glucose.



Question #1

1. What is Diabetes? In your own words, try to write what you've learned about Diabetes.

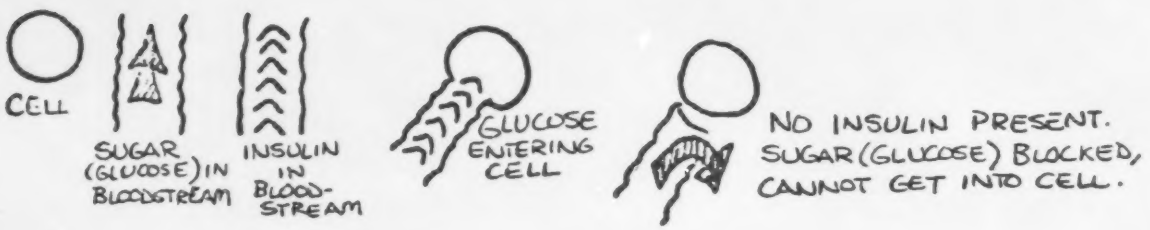
Answer:

You are absolutely correct if you said something like this: Diabetes is a disease condition in which glucose (sugar) is unable to enter the cells of the body.

PRACTICE EXERCISE #2

Insulin is a hormone produced by the pancreas that must be present in order for the cells to use sugar (glucose)

It lowers blood-sugar by allowing sugar (glucose) to enter the cells.


CELL
SUGAR (GLUCOSE) IN BLOODSTREAM
INSULIN IN BLOOD-STREAM
GLUCOSE ENTERING CELL
NO INSULIN PRESENT. SUGAR (GLUCOSE) BLOCKED, CANNOT GET INTO CELL.

Question #2

What is insulin and how does it affect blood-sugar? Try to write the answer in your own words.

Answer:

Good for you if you said insulin is a hormone produced by the pancreas that allows blood-sugar to enter the cells. It lowers the glucose (sugar) that is in the blood.

PRACTICE EXERCISE #3

The body cannot use glucose if insulin is not present. Glucose is necessary for life. Some diabetics do not make insulin in the body, therefore, they must take it by injection (shot). Are you a diabetic that will need to take shots?

Question #3

Why is it necessary for some Diabetics to take insulin? Answer in your own words if you can.

Answer:

Did you say something like the following? Insulin must be present in order for glucose to enter the cells. Glucose (sugar) is necessary for life. The bodies of some diabetics do not produce any insulin. Therefore, it must be taken into the body by injection (shot) each day.

PRACTICE EXERCISE #4

Sometimes diabetics must take different types of insulin. Insulin is categorized according to its speed of action.

Rapid-acting

Intermediate-acting

Long-acting

Question #4

What is the difference between the three different types of insulin mentioned above?

Answer

Speed of action is the difference - whether the insulin is 1) rapid-acting, 2) intermediate-acting, or 3) long-acting.

PRACTICE EXERCISE #5

There are two kinds of insulin in each of the three categories.

Rapid acting Insulin:

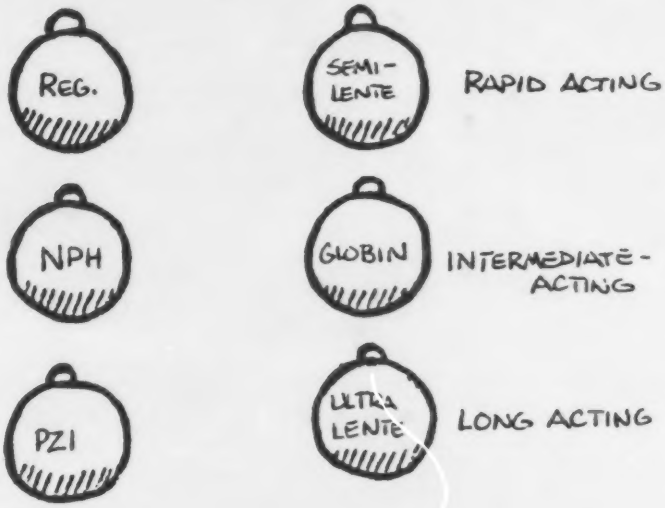
1. Regular
2. Semi-lente

Intermediate-acting

1. NPH
2. Globin

Long-acting:

1. PZI
2. Ultralente



Question #5

List the name of at least one insulin in each of the three categories.

a. Rapid-Acting: _____

b. Intermediate-Acting: _____

c. Long-Acting: _____

Answer:

You might have listed:

Rapid acting

regular or semilente

Intermediate-acting

NPH or globin

Long-acting:

PZI or ultralente

PRACTICE EXERCISE #6

Insulin is presently packaged in three different strengths. They are as follows:

U40 - meaning there are 40 units of insulin in one milliliter.
U80 - there are 80 units of insulin in one milliliter.
U100 - there are 100 units of insulin in one milliliter.

Before you go on, notice the abbreviations on the illustrations. That's how doctors and druggists sometimes abbreviate 40 units in one milliliter: 40 u/ml, etc. Let's see if you can remember these three packagings. Without looking back, list the three strengths on insulin.

1)

2)

3)

Answer:

Your correct answer is:

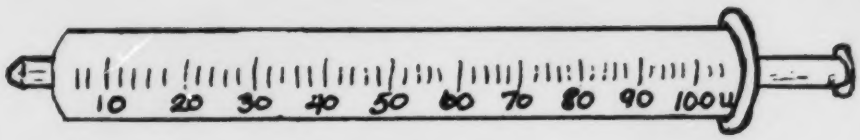
1) U40

2) U80

3) U100

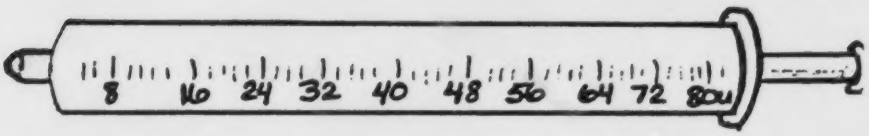
Give yourself an extra pat on the back if you added the measurements 40u/ml; 80u/ml; 100u/ml.

Diabetic patients who take insulin frequently take too much or too little, because they fail to use a syringe that matches the insulin presdribed.

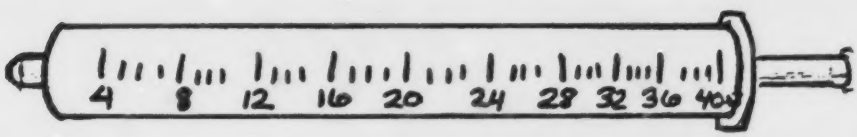


A U100 syringe calibrated (marked) in 100 units per milliliter used with U100 insulin.

A 25-gauge 1/2" or 5/8" needle should be used to give insulin.



A U80 syringe (marked in 80 units per milliliter) with U80 insulin.



A U40 syringe (marked in 40 units per milliliter) with U40 insulin.

Question #7

Can you name the kind of syringe and needle you would use with each of the following insulins?

Insulin	Syringe	Needle
U40		
U80		
U100		

Answer:

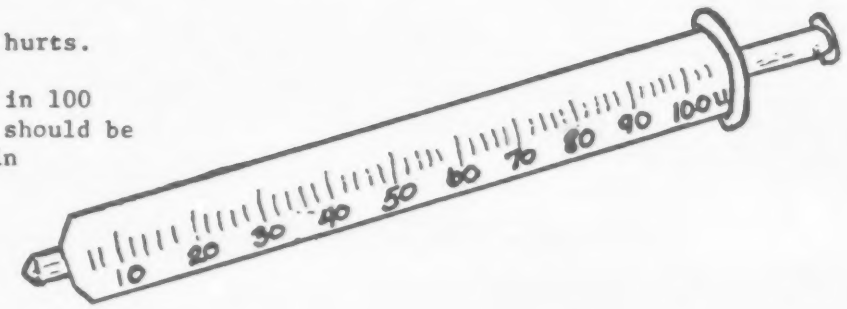
This is the way you should have filled in the spaces. Were you right?

Insulin	Syringe	Needle
U40	U40	25-gauge, ½" or 5/8"
U80	U80	25-gauge, ½" or 5/8"
U100	U100	25-gauge, ½" or 5/8 "

PRACTICE EXERCISE #8

A quick review never hurts.

A syringe marked off in 100 units per milliliter should be used with U100 insulin



A 25 gauge ½ or 5/8-inch needle should be used to give insulin with any of the three syringes

Question 8

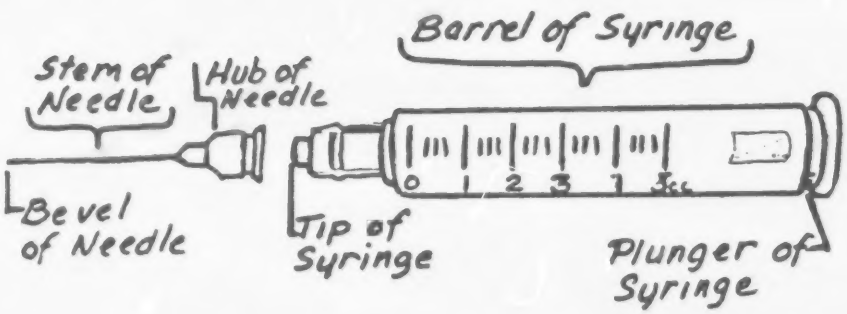
Now imagine that your physician has prescribed 45 units of U100 insulin for you. What kind of syringe and needle would you use?

Feedback

An insulin syringe that contains '00 units in each milliliter and a 25 gauge 1/2 or 5/8-inch needle should be used to administer the insulin prescribed.

PRACTICE EXERCISE #9

To talk to the doctor, nurse, or druggist, you need to know some of their language. Study the diagram of the syringe and needle until you think you know the names of the various parts and what they look like.

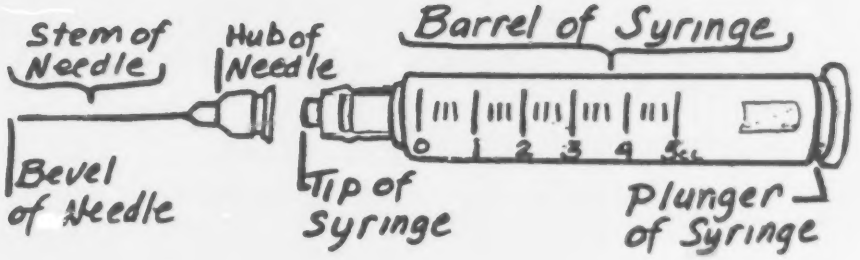


Question #9

Without looking back at the diagram draw a rough picture of a syringe and needle here and label the parts.

Answer

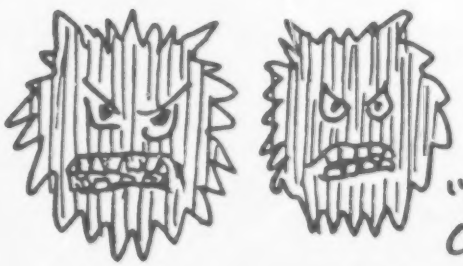
You've succeeded at this difficult question if your drawing roughly resembles this:



PRACTICE EXERCISE #10

Now that you know the parts of the syringe and needle, it's important to remember that you should not touch the five parts listed below. You need to keep them sterile to prevent giving yourself infection.

1. The plunger of the syringe.
2. Inside the barrel of the syringe.
3. The tip of the syringe.
4. The bevel of the needle.
5. The stem of the needle.



Question #10

a. List the parts of the insulin syringe and needle (shown in the picture of practice question #9) that should be kept sterile (not touched).

b. State (in writing) why these parts should remain sterile (free from germs).

Answer

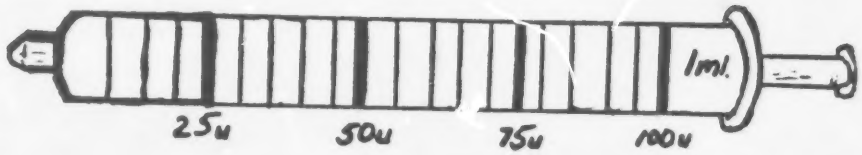
a. The parts of the syringe and needle that should be kept sterile are as follows:

The 1) plunger, 2) inside the barrel and the 3) tip of the syringe. The 4) bevel and the 5) stem of the needle.

b. The very important reason is to keep them sterile - free from germs- so that you do not get an infection.

PRACTICE EXERCISE #11

Each line on the syringe to the right represents five units of U100 insulin. (The heavy lines represent 25 units)

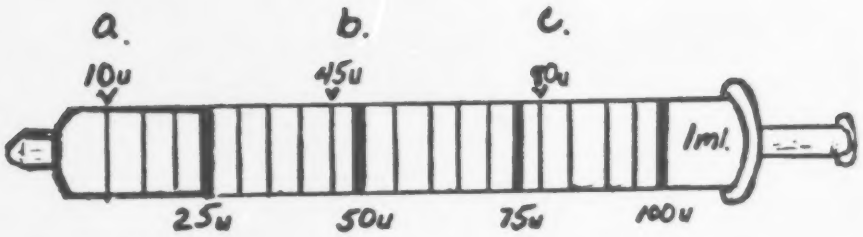


Question #11

Draw arrows on the syringe in the Answer Sheet showing where your insulin would stop if you were asked to give the following dosages of U100 insulin:

a. 10 units
b. 45 units
c. 80 units

Answer



PRACTICE EXERCISE #12

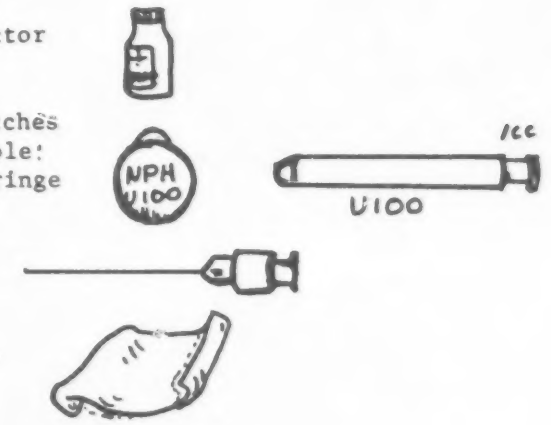
Before starting to draw up insulin you need four things:

1) The type of insulin the doctor prescribed for you.

2) An insulin syringe that matches the units of insulin (example: U100 insulin requires a syringe that has 100 units in each milliliter).

3) A needle

4) An alcohol cotton swab



Question #12

The physician has prescribed 50 units of NPH insulin U100 for you to take each morning before breakfast. List the equipment you need.

1)

2)

3)

4)

Answer

You need a vial of U100 NPH insulin, a U100 syringe, a needle and an alcohol swab.

Did you list all four? You are really doing extra well if you remembered that the needle should be a 25-gauge, 1/2" or 5/8" needle, even though we didn't review that in this section.

PRACTICE EXERCISE #13

Now let's put the procedure together. Every step is important, but pay special attention to Step II because if insulin is cloudy it must be mixed well by rolling it between your hands.

Step I

Wash hands

Step II

Mix insulin if cloudy, by hand, rolling it.

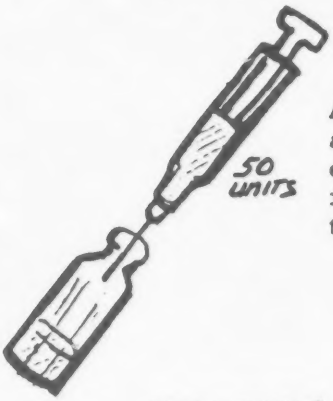
Step III

Assemble syringe and needle keeping them sterile

Step IV

Wipe the rubb stopper of th vial with the alcohol swab

Step V

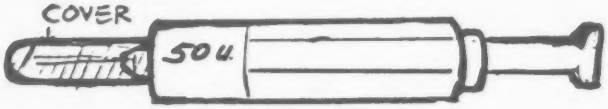


An amount of air equal to the dosage of insulin is injected into the vial.

Step VI

Turn vial upside down and pull back on plunger until insulin reaches the 50 unit mark on the syringe.

Step VII



Cover the needle to keep it sterile until you're ready to inject the insulin.

Question #13

Demonstrate how you would prepare 50 units of insulin prescribed by your physician.

Answer

To be successful, you must go through Steps I-VII in the order shown on Page 20. Please look back and see if you missed any steps.

You'll have another opportunity to demonstrate this procedure in the Self-Check that follows.

SELF-CHECK

1. In your own words, what is diabetes?

2. What is insulin?

3. How does insulin affect blood sugar?

4. Equipment needed in preparing an insulin injection includes all of the following except: (Cross out unneeded items).

   1) type of insulin prescribed
   2) disposable insulin syringe
   3) 22 gauge 1-1/2" needle
   4) 25 gauge 5/8" needle
   5) alcohol swab
   6) medication card

5. How many units of insulin is in one milliliter of the following:

   a. u 40
   b. u 80
   c. u 100

6. List at least one type of insulin in each of the following categories:

   a. Rapid-acting

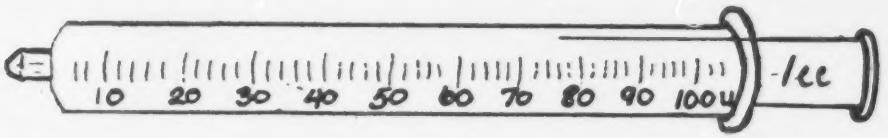
   b. Intermediate-acting

   c. Long-acting

7. The following parts of the insulin syringe and needle should be kept sterile: (Circle correct items.)

   1) The barrel of the syringe
   2) The stem of the needle
   3) The hub of the needle
   4) The tip of the syringe
   5) The plunger of the syringe

8. You are on 45 units of NPH insulin u100. Shade the diagram indicating the amount of insulin you would administer.



9. How much air would you inject into the vial before drawing out the insulin in the question above?

10. Number the following steps in drawing insulin from a vial in the order that you would perform them:

a - inject air into the vial equal to the dosage of insulin to be drawn.

b - turn vial upside down and draw into the syringe the prescribed dosage of insulin.

c.- wash hands

d - wipe rubber stopper with alcohol swab

e - assemble syringe and needle

f.- mix insulin by handrolling if cloudy.

g - cover needle

11. Draw insulin from a vial (as the nurse observes) using the correct sequence and preparing the correct dosage.

SELF-CHECK ANSWER KEY

1. Diabetes is a disease condition in which the body cells are unable to use glucose (sugar) adequately.

2. Insulin is a hormone produced by the pancreas, which must be present for the body to use glucose (sugar).

3. Insulin lowers the blood sugar by allowing glucose to enter the cells (where it is used for energy).

4. 3 and 6 should be crossed out

5. A. 40 units per milliliter

   B. 80 units per milliliter

   C. 100 units per milliliter

6. A. Rapid acting

   Regular or semilente

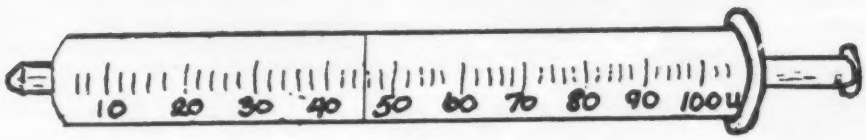
   B. Intermediate acting

   NPH or globin

   C. Long acting

   Protamine Zinc or ultralente

7. 2,4, and 5 should be circles

8. 

9. 45 units

10. a V
    b VI
    c I
    d IV
    e III
    f II
    G VII

11. When ready to practice, demonstrate procedure to nurse (on floor, outpatient department, or public health nurse) using the steps on Page 20 as a check list.

HEALTH INSTRUCTION EXCHANGE
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A PROJECT OF THE LEAGUE FOR INNOVATION IN THE COMMUNITY COLLEGE

THE USE OF INSULIN IN THE TREATMENT OF DIABETES

by

Ronald H. Wakasa

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TITLE OF PACKAGE:	The Use Of Insulin In The Treatment of Diabetes
AUTHOR:	Ronald H. Wakasa
INSTITUTION:	U.C.L.A. (Family Practice Center), Los Angeles, Calif.
INTENDED STUDENTS:	Diabetic Patients
ESTIMATED WORKING TIME:	30 minutes
MATERIALS NEEDED:	None
Revised	Oct. 1, 1977

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INTRODUCTION

Diabetes is a leading disease in the United States. The diabetic must have a solid understanding of his insulin therapy so that he can adquately improve the quality of his management. This package will provide you with basic facts regarding insulin therapy so you can better comply with your doctor's prescribed instructions.

When you have completed this package you will be able to effectively describe basic facts regarding the use of insulin in the treatment of diabetes.

You also will be able to: identify the various preparations of insulin and compare their peak action and duration of action; identify the appropriate storage and care of insulins; describe signs and symptoms of hypoglycemia (decreased blood sugar) while on insulin therapy and state an appropriate treatment; list two adverse effects related to insulin therapy and preventive measures, and be able to list steps in preparing an insulin dose.

Have fun and enjoy yourself.

Many types of insulins are available. They differ in onset of peak action and duration.

Rapid acting insulins include Regular and Semi-lente insulin. Both act rapidly and have a short duration of action requiring 2 - 3 injections per day.

Intermediate acting insulin includes NPH and Lente, which have similar peak effects and duration of action. The effects last about 24 hours and provide a moderate carryover the next morning.

Long Acting insulins include Protamine and Ultra-lente which have a duration of greater than 24 hours. They permit a decreased number of injections.

TYPES OF INSULINS AND CHARACTERISTICS

Type	Peak Action	Duration of Action
Rapid Acting		
Regular	4 - 6 hours	5 - 7 hours
Semi-lente	4 - 6 hours	12 - 16 hours
Intermediate Acting		
NPH	8 -12 hours	18 - 24 hours
Lente	8 -12 hours	18 - 24 hours
Long Acting		
Protamine	14 -20 hours	24 - 36 hours
Ultra-Lente	16 -18 hours	30 - 36 hours

1. Let's see how much you recall. Circle the correct answer - a, b, or c - in each of the following questions.

1) NPH and Lente insulins fall into which type of insulin?

   a. Rapid acting, peak 4 - 6 hours, duration 5 - 16 hours

   b. Intermediate acting, peak 8 - 12 hours, duration 18 - 24 hrs

   c. Long Acting, peak 14 - 18 hours, duration 24 - 36 hours

2) Regular and Semi-Lente insulins fall into which type of insulin?

   a. Rapid acting

   b. Intermediate acting

   c. Long acting

3) Protamine zinc and Ultra-Lente fall into which type of insulin?

   a. Rapid acting

   b. Intermediate acting

   c. Long acting

You were 100% correct if you answered like this:

1) b

2) a

3) c

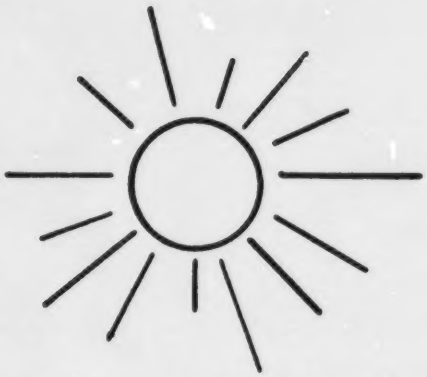
If confusion arose, please refer to chart for a brief review and try again.

If no problems, "good job" and proceed on.

Generally all insulins are stable at room temperature (75 degrees Fahrenheit) for the life of the vial, which may be several weeks. Regular insulin only may lose 10% of its activity after 18 months. The modified insulins (all insulins except Regular) at temperatures greater than 75 degrees F. will coagulate (clump together) within a few days. Although there is not a total loss of potency, the ability to withdraw a uniform dose and to predict the onset of action and duration is reduced. Freezing may also result in clumping and a reduction in uniformity.

Do not use a bottle of insulin if the expiration date printed on the label has past.

When traveling, insulin bottles may be placed between layers of clothing.



AVOID EXTREME TEMPERATURE

CLUMPING MAY RESULT AND THE ABILITY TO WITHDRAW A UNIFORM DOSE IS REDUCED

INSULIN SHOULD BE STORED IN A COOL PLACE, PREFERABLY THE REFRIGERATOR

2. Mark the following statements with a T if it is true and with an F if it is false.

____ 1) Generally, all insulins are stable at room temperature.

____ 2) When traveling, insulir bottles may be placed between layers of clothing.

____ 3) Regular insulin only may lose 10% of its activity after 18 months.

____ 4) Do not use a bottle of insulin if the expiration date printed on the label has past.

____ 5) Modified insulins at temperatures greater than 75 degrees F will clump together and the ability to withdraw a uniform dose is reduced.

You are correct if you answered TRUE for all five questions.

The most common and dangerous complication of insulin therapy is hypoglycemia, which is a fall in blood sugar.

Signs and symptoms of hypoglycemia include nausea, hunger, fatigue, confusion, sweating, tremors, imbalance, drowsiness, and blurred vision.

Treatment consists of immediate administration of any concentrated source of glucose such as candy or sugar.

Now, read over the following case and then answer the questions that follow.

J.W. is a 32-year-old diabetic controlled on NPH insulin. After finding that his pants were too tight and he was gaining weight, he decided to start exercising and today he skipped 2 meals. Around 3:00 p.m. he began to feel nauseated and hungry. He felt very drowsy and fatigued with his palms becoming sweaty and his hands trembling. His vision blurred and he was wobbly on his feet.

3. 1) Describe the signs and symptoms of hypoglycemia the patient is experiencing.

_____

_____

_____

2) Identify an appropriate treatment.

_____

_____

Your answer should be that the patient exhibited the following signs and symptoms of hypoglycemia:

Nauseated, hungry, drowsy, fatigued, palms sweaty, hands trembling, vision blurred, wobbly on feet.

Appropriate treatment:

Administer concentrated source of glucose such as sugar or candy.

Good job, have you experienced any of these symptoms?

Lipodystrophy is a complication of insulin that can occur in two forms. Lipodystrophy is an atrophy (subcutaneous concavities caused by a wasting of the lipid or fat tissue) that appears as indentations at the sites of the insulin injection.

Lipodystrophy can also occur as tumerous-like fat pads at the site of injection. To avoid this, patients should avoid injecting one site more frequently than once every 3 - 4 weeks.

Other adverse effects related to insulin include hypoglycemia. The predisposing factors include: insufficient food intake (skipped meals), excessive exercise, and an inaccurate measurement of insulin.

Skin reactions may also occur as hives, itching and redness possibly related to the source of insulin.

4. List <u>two adverse effects</u> related to insulin therapy <u>and their preventive measures</u>.

1) _____

_____

_____

_____

_____

_____

2) _____

_____

_____

_____

_____

_____

Any two of the following answers would be appropriate:

1) Lipodystrophy - either concavities or tumorous - like fat pads at the site of injection.

A preventive measure - rotate the sites of injection

2) Hypoglycemia - decrease in blood sugar.

Preventive measures: accurately measure insulin, avoid excessive exercise and eat properly and do not skip meals.

3) Skin reactions (hives, itch)

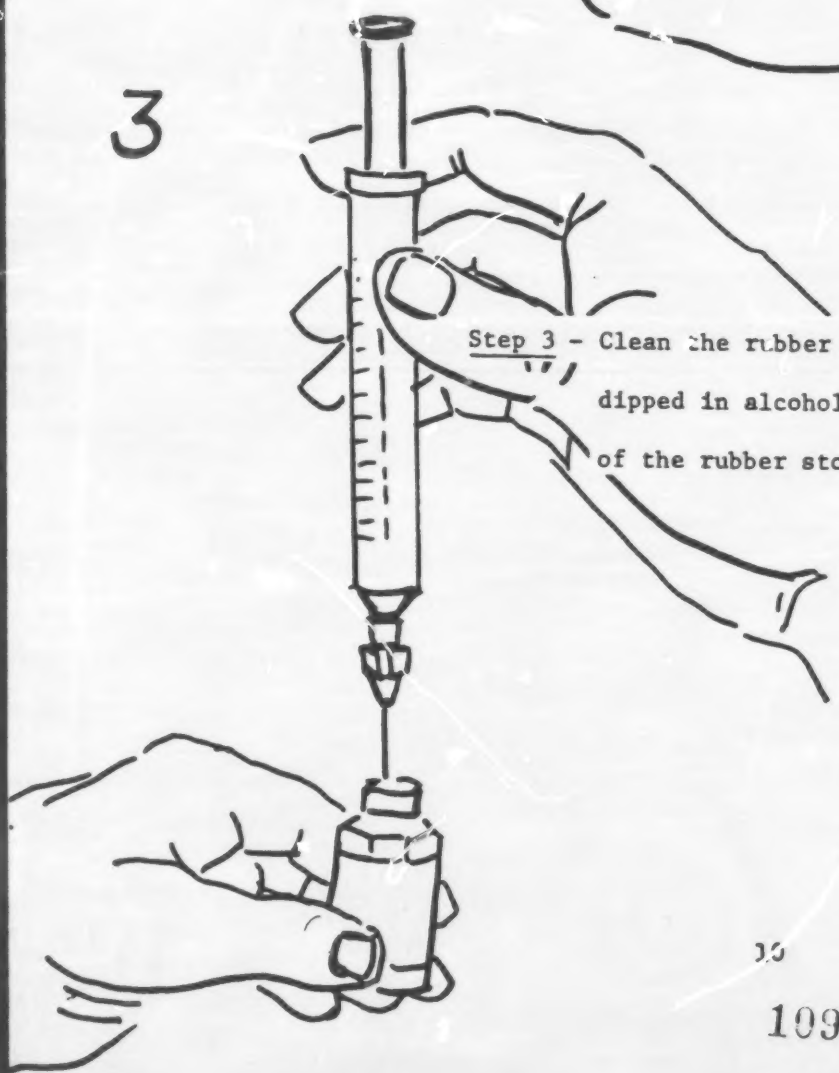
Preventive measures: possibly change the source of insulin.

Now that you can describe basic facts of insulin therapy, proceed on to preparing an insulin dose for injection.

Preparing the insulin dose involves five steps.

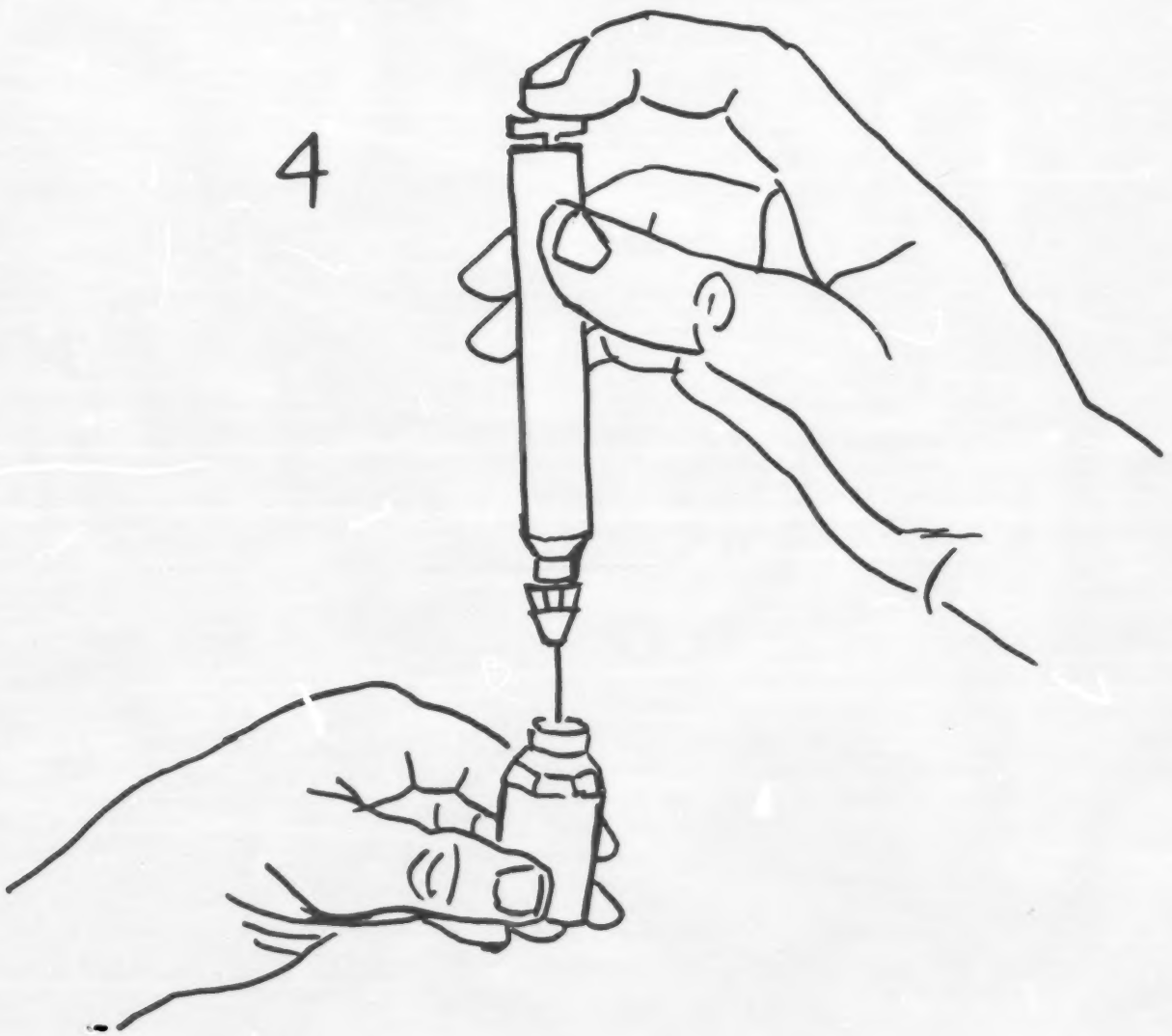
Step 1 - Regular insulin is the only clear insulin. If NPH insulin, Protamine insulin or Lente insulin (which are cloudy) is used you need to mix it thoroughly. Do not shake (up and down) which causes foam to form. Invert the vial and gently rotate the vial in your hands. Flip off the protective cap.

Step 2 - Draw air into syringe equal to the insulin dose to be withdrawn. To do this, pull back the plunger.



Step 3 - Clean the rubber stopper with an alcohol wipe or cotton dipped in alcohol. Insert the needle through the center of the rubber stopper.

Step 4 - Inject the air from the syringe into the vial by pushing down on the plunger.



Step 5 - Invert the bottle and syringe. Withdraw specified dose. Remove any air bubbles from the syringe by holding the point of the syringe up and depressing the plunger slightly.

5. List the appropriate steps in sequence of preparing an insulin dose. (Summarize in your own words.)

Your summaries should cover these steps:

Step 1 - Mix thoroughly by inverting vial and rotating it in your hands. Take off protective cap.

Step 2 - Draw air into syringe equal to insulin dose.

Step 3 -Clean rubber stopper with an alcohol sponge. Insert the needle through the center of the rubber stopper.

Step 4 -Inject air into the syringe.

Step 5 -Invert vial and syringe and withdraw appropriate dose, making sure all air bubbles are out by holding the point up and depressing the plunger slightly.

If you had any problems answering the practice questions, take a little time now to review the sections that gave you trouble. It will be time well spent.

When you are ready to take the Self-Check Exercise, turn the page.

SELF-CHECK

1. Match the following insulins with duration of action and peak action.

   Place corresponding letter in front of insulins.

   (1) _____ NPH, Lente

   (2) _____ Regular, Semi-lente

   (3) _____ Protamine Ultra-Lente

   a. Rapid acting
      Peak: 4 - 6 hours
      Duration: 5 - 16 hours

   b. Intermediate acting
      Peak: 8 - 12 hours
      Duration: 18 - 24 hours

   c. Long acting
      Peak: 14 - 18 hours
      Duration: 24 - 36 hours

2. Answer each of the following statements with a TRUE or FALSE.

   (1)_____ After the expiration date printed on the label of the insulin bottle, you should not use the insulin.

   (2)_____ Regular insulin (only) may lose 10% of its activity at room temperature after 18 months.

   (3)_____ Modified insulins (all insulin except regular insulin) may clump together at temperatures greater than 75 degrees and the ability to wirthdraw a uniform dose is reduced.

   (4)_____ In traveling, insulin may be placed between layers of clothing.

3. Describe the signs and symptoms of hypoglycemia and the treatment if this should occur.

   (1) Signs and Symptoms:

   (2) Treatment:

4. List two adverse effects related to insulin therapy and state appropriate preventive measures.

   (1)

   (2)

5. List the appropriate steps in sequence of preparing an insulin dose.

   Step 1.

   Step 2.

   Step 3.

   Step 4.

   Step 5.

ANSWERS TO SELF-CHECK

1. (1) b
   (2) a
   (3) c

2. (1) True
   (2) True
   (3) True
   (4) True

3. (1) Signs and symptoms: nausea, hunger, fatigue, confusion, sweating, tremors, unbalance, drowsiness, blurred vision
   (2) Treatment: administration of any concentrated source of glucose such as candy or sugar

4. Any two of the following:
   (1) Lipodystrophy - concavities or indentations - tumorous like fat pads at site of injection
   Preventive Measure: Rotate injection sites
   (2) Hypoglycemia (decrease in blood sugar)
   Preventive Measures: Accurately measure insulin, avoid excessive exercise and eat properly, do not skip meals
   (3) Skin reactions (hives, itch, redness)
   Preventive Measure: Possibly change source of insulin.

ANSWERS TO SELF-CHECK (Continued)

5. Step 1. Mix - rotate vial in hands

   Step 2. Draw air into syringe equal to insulin dose

   Step 3. Clean rubber stopper, insert needle through center of stopper

   Step 4. Inject air into vial

   Step 5. Withdraw dose, make sure bubbles are out

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DIABETIC FOOT CARE

By

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TITLE:	Diabetic Foot Care
AUTHOR:	Judith A. Smith, RN
INSTITUTION:	Midland (Mich.) Visiting Nurse Association
INTENDED STUDENTS:	Diabetic patient in hospital or home
ESTIMATED WORKING TIME:	20 minutes
MATERIALS NEEDED:	Container (foot size plastic pan); water (warm), soap (mild, bar type); wash cloth; towel
REVISED:	August 1, 1977

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You are a diabetic and your feet are diabetic but deserve a little extra anyway. They are so neglected. Diabetic feet rate the best!

As a diabetic, your blood flow is slower. The feeling in your feet may also be less. These two things can cause big problems. Problems you may not know exist unless you get to know your feet better.

You say your feet are a long way away? You haven't seen them in a while? Come with me and meet your feet.

It is my hope that at the end of this unit you will be able to care for your feet every day. You will be able to select the equipment needed; wash your feet properly; identify four reasons for inspecting your feet daily; identify what to look for on inspection, and to actually inspect your feet.

My greatest hope is that you will enjoy this exercise and want to do even more for your feet.

You've met your feet again. At least, there they are. But, do you really know them? Intimately? Let's renew the acquaintance by giving them a warm welcome - a bath.

We'll get organized by assembling a few items you need for that welcoming bath.

Equipment needed

container
water
soap
cloth
towel

These items are very basic and easily found in your home.

Use a tub-like container, a plastic one is convenient. Use only warm water, your feet are tender. A mild bar of soap is just right. A soft cloth for washing is soothing. A soft towel is absorbent for blotting and patting dry.

PRACTICE QUESTION #1

STOP!

List the five items you need to wash your feet.

1) _____

2) _____

3) _____

4) _____

5) _____

FEEDBACK

Your list should include these items:

a container

water

bar of soap

wash cloth

towel

During the foot bath, there are four areas you should give special attention. They are:

toes
between the toes
sole
heel

A foot is a foot, right? But, this is <u>your</u> foot and it hasn't had your attention in a <u>long</u> time, so ----------

PRACTICE QUESTION #2

List the four areas of your foot you are going to give special attention.

1) _____

2) _____

3) _____

4) _____

FEEDBACK

toes

between the toes

sole

heel

Did you remember between the toes?

Now you're ready for sure pleasure.

You and your foot are now ready for the ultimate experience, the foot bath. Imagine with me ----------

Warm, comforting water

A soapy lather gently washing

Your hand or cloth gently massaging your arch,

between your toes, rubbing your sole and heel

RELAX!!

Lean back and let your foot feel floaty.

Wiggle your toes. Ah-----!

Warm water rinsing

Gentle touch

Soft touch gently patting and blotting dry your foot.

STOP DREAMING!

STOP EVERYTHING!

<u>Fill the pan with water</u> and <u>wash</u> your <u>left</u> foot

PRACTICE QUESTION #3

How does your right foot feel?

FEEDBACK

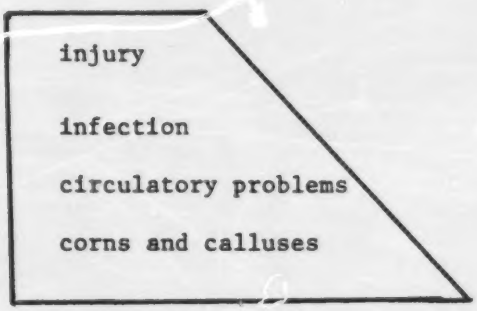
I hope your right foot is feeling neglected.

The left foot feels so good!

Leave your left shoe and sock off. Your foot will enjoy the freedom from its many disguises.

You need to get still more involved with your feet. This is done through INSPECTION. Your feet need you. They depend on you to daily check them.

TO
FIND
ANY



PRACTICE QUESTION #4

List four reasons why daily inspection is needed.

1) _____

2) _____

3) _____

4) _____

FEEDBACK

Your reasons for inspection should include:

check for/identify injury

check for/identify infection

check for/identify circulatory changes

check for/identify presence of corns and calluses

Now you have a chance to really get intimate with your foot. It's time to check it for the clues it can give you during your daily inspection.

You might find a	
blister	itching
corn	breaks in the skin
callus	change in skin color
swelling	broken nail
sore	changes in skin temperature
pressure area	
bleeding	
nails too long	

Each clue can help you find the cause. This knowledge helps you live <u>with</u> your diabetes.

PRACTICE QUESTION #5

What are five clues you would look for on the inspection of your foot?

1) _____

2) _____

3) _____

4) _____

5) _____

FEEDBACK

You might find:

a) sore

blister

corn

callus

skin break

pressure area

skin color change

bruise

broken nail

swelling

skin temperature change

bleeding

nails too long

itching

Don't put your shoe on yet.

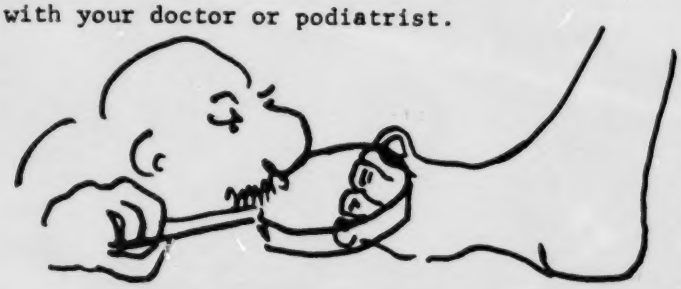
Look at your left foot carefully to find any clues.

PRACTICE QUESTION #6

Check your left foot now and record what you find.

FEEDBACK

I'm sure you found a few clues. Some may be "normal" for your foot, but you need to know them to tell the difference when a problem or change is found. If you found a problem, you should check it with your doctor or podiatrist.



Your feet love that "extra" attention you gave them today. Now they expect it. So, it's not "Good-bye, feet", but "Hello", again and again and again.

POST TEST

1. Choose five items from list you need to wash your feet.

____ foot size container
____ body lotion
____ brush
____ warm water
____ bath oil
____bar soap
____ towel
____ bubble bath
____ body powder
____ wash cloth
____ foot powder

2. Four areas of your feet should have extra attention:
Choose them.

1) ankle
2) toes
3) heel
4) between toes
5) arch
6) sole

3. Demonstrate foot wash using right foot.

4. You will be inspecting your feet every day. This exercise will help you identify major areas of concern. Select four from the following:

1) insulin dose
2) injury
3) corns and calluses
4) diet changes
5) infections
6) circulatory problems

5. You need to identify the clues your feet may give you as a signal of problem. List four clues.

1) _____

2) _____

3) _____

4) _____

6. Demonstrate inspection of your right foot.

POST-TEST ANSWER KEY

1. Your choices should have been:

   container
   water
   bar of soap
   towel
   wash cloth

2. Answers are 2, 3, 4, 6

3. Your comfort is the answer

4. The four choices are: 2, 3, 5, 6

5. You may have correctly chosen:

blister	skin color change
corn	skin temperature change
callus	itching
pain	break in skin
bleeding	condition of nails
sore	pressure areas
	swelling

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JUL 17 1981